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Government Intervention in Soviet Agriculture

Estimates of Consumer and Producer Subsidy Equivalents

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Abstract

Government intervention in agriculture in the USSR is substantial. Data on agricultural policy programs for 1986 indicate large subsidies accruing simultaneously to producers and consumers. The most significant subsidy channel in the USSR is the system of prices. Domestic consumer prices are administratively held well below world market levels, while domestic producer prices are generally above world market levels. Since 1986, the overall amount of support to agriculture in the USSR has increased. Subsidies to producers, though, have declined, while subsidies to consumers have increased significantly.

Keywords: producer subsidy equivalent (PSE), consumer subsidy equivalent (CSE), price, tax, policy, exchange rate, budgetary allocations.

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Contents

Summary

This study represents the first known application of the concept of producer and consumer subsidy equivalents (PSE's/CSE's) to the USSR. Estimates were made for 1986, the latest year for which necessary data are available. Government support programs to agriculture in the USSR are large by international standards. Soviet support to producers in 1986 (PSE of 26 percent) is not unusually large when compared with other developed, and some developing, countries. Support to consumers in 1986 (CSE of 36 percent) is very large by international standards. Of the countries for which PSE's and CSE's have been calculated, the USSR is the only one with large simultaneous support to both producers and consumers.

The PSE's and CSE's are calculated by quantifying the effect of major policy programs in agriculture. The most important channel of support is the price system. Domestic consumer prices are administratively set well below world market levels, while domestic producer prices are generally above world market levels. In addition, the Government administers substantial transfer programs to producers, most of which have been captured here. The relationship of these Government programs to Soviet consumers and producers is determined with the use of reference (border) prices that reflect world market signals. PSE's and CSE's represent the amount of money that would be required to compensate domestic producers and consumers if existing government support programs were eliminated and consumers and producers faced world market prices.

In the USSR, the Government intervenes in agriculture in ways that are not common in Western economies and are not captured in this study. These include administrative (nonprice) control over resource allocation, production-level management, and marketing. These differences should be kept in mind when drawing comparisons between Soviet PSE's/CSE's and those of Western countries.

Although the full set of data necessary for updating the Soviet PSE/CSE calculations beyond 1986 is not yet available, two additional scenarios are developed to reflect changes since that year. Allowing for higher reference prices for wheat and coarse grains results in the Soviet aggregate PSE falling to 20 percent, while the aggregate CSE climbs to 47 percent. Allowing for both higher grain reference prices and a moderate devaluation of the ruble against the dollar results in an aggregate PSE of -10 percent and an aggregate CSE of 93 percent, an incredibly large level of support to consumers.

Government Intervention in Soviet Agriculture

Estimates of Consumer and Producer Subsidy Equivalents

Edward C. Cook, William M. Liefert, and Robert Koopman*

Introduction

This study analyzes the size of Soviet Government support programs in agriculture and the food economy. The support programs examined include price subsidies (subsidized wedges between producer and consumer prices) and major direct producer subsidies (inputs, construction, for example). Relevant border prices are used to measure the extent to which these support programs subsidize domestic producers and consumers of important agricultural commodities.

Calculation of producer subsidy equivalents (PSE's) and consumer subsidy equivalents (CSE's) have been made in recent years for many market economies, both developed and developing (25).[1] This study represents the first known application of the PSE/CSE approach to the USSR, an important player in world agricultural markets. PSE's and CSE's represent the amount of money that would be required to compensate domestic producers or consumers if existing government support programs were eliminated. The border, or reference, prices reflect relevant free trade prices for the commodities studied. Because the ruble is not a convertible currency, calculation of a shadow exchange rate was made for the purpose of converting reference prices in dollars into domestic prices in rubles.

Estimates of support were made for 1986 (the latest year for which much of the necessary data were available). A discussion of the important changes since 1986 is included at the end of the results section. This report does not attempt to measure the effect of eliminating identified support programs or, further, of full liberalization of trade.

Under conditions of free trade, domestic prices would be equivalent to relevant border prices (ignoring complications of internal marketing). Discrepancies would result in greater or lesser imports or exports until equivalence between domestic and trade prices had been achieved. Government intervention in trade allows these discrepancies to be maintained. In the USSR, the inconvertibility of the ruble, combined with state control of hard currency and the existence of state-run foreign trade organizations (FTO's), which hold virtual monopoly control over the trade of agricultural commodities, result in effective control over trade. Elimination of these trade interventions would be a

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[1]Underscored numbers in parentheses indicate item in References.

necessary, but not sufficient, condition for equalization of border trade and domestic prices. The USSR has a complex system of administered producer and consumer prices, which would be out of place in a free-trade environment. Furthermore, Soviet producers cannot be considered true profit maximizers. To a lesser or greater extent, they all face administrative directives which constrain their operational autonomy by establishing, for instance, specific quantity sales targets for major commodities, control over use of farm revenue, and access to credit and state investment funds. Given this situation, Soviet producers would not respond fully to elimination of trade interventions and administrative control of domestic prices.

This report is a first step in addressing questions of trade liberalization by the USSR. Subsequent reports will present a world trade model to estimate both domestic Soviet and worldwide price and quantity impacts that would come from Soviet trade liberalization.

Many Soviet sources were used in estimating the PSE's and CSE's. Books and articles in the Soviet professional literature were important, especially for budgetary data. Statistical compilations of the former Central Statistical Bureau (now the State Committee for Statistics) and the State Price Committee were invaluable. A full list of references is included at the end of the report.

The Concept of Subsidy Equivalents

Producer and consumer subsidy equivalents measure the extent to which government policies influence domestic agricultural markets. PSE's and CSE's were developed to examine market systems, and normal assumptions about profit maximization, consumer sovereignty, and competition are implied. In the absence of government intervention, prices are assumed to be determined in freely functioning markets, to be equal to available world market prices, and to reflect the social costs of production. Both producers' profit maximization and consumer preferences influence production patterns. If domestic prices are lower than world trade prices, there is an incentive to increase domestic production and exports until those prices are equal. If domestic prices are higher, domestic production contracts.

If the government intervenes, prices paid by domestic producers and consumers can differ from foreign trade prices. As well as border measures that directly influence trade, government transfer policies can act to subsidize or tax domestic producers and consumers, and thus to distort markets. Some common transfer policies include subsidies for inputs and services that benefit producers.

PSE's and CSE's represent the amount of money that would be required to compensate domestic producers and consumers if existing government intervention were eliminated and producers and consumers faced world market prices. PSE's and CSE's thus reflect the degree to which domestic markets are distorted in comparison with the world market. For the USSR, CSE's are here defined as the difference between average domestic consumer prices and relevant foreign trade (reference) prices. PSE's are defined as the difference between average producer prices and those same reference prices *plus* the

value of identified policy transfers attributed to each commodity. This approach assumes that the dollar value of a policy transfer--say an input subsidy--is equivalent to an additional dollar in the producer price. That is, the producer is indifferent to an additional dollar of input subsidies or an additional dollar in the price of his product.

The Soviet Agricultural Policy Environment

Because the USSR does not have a market economy, the implications of using the PSE/CSE approach need to be examined. Soviet agriculture is characterized by large-scale state and collective farms, with operations tightly controlled by the state administrative bureaucracy. Farm managers are appointed by the state and are responsible for satisfying administrative directives received throughout the year. The most obvious areas of state control include the allocation of investment resources, targets for sales to the state of agricultural commodities, and the prices for both inputs and output. Price, tax, and credit policies are used to ensure that farms can fulfill these plans and remain financially viable. For example, farms failing to make a profit have received credit on very lenient terms, with the loan frequently written off. Prices have also been adjusted to support high-cost producers. Conversely, low-cost producers face relatively low prices, and when farms have earned "excessive" profits, such profits have been confiscated by the state.

Beyond these broad areas of state control, farms frequently face detailed directives (primarily from the local or regional administrative apparatus) on all aspects of their operation. Such directives can address the timing of field operations, the number of animals to keep, the area sown to each crop, the organization of the farm's labor force, the allocation of farm financial funds, and so forth. As a result, farms are only to a slight extent price-responsive; they do not behave as true profit maximizers.

The state similarly controls farm input industries. Input producers have traditionally had access to controlled distribution channels with prices guaranteed by the state. Established prices are based on production costs and estimated productivity. Farms have no real influence over input prices and little influence on the product mix or product quality of input producers.

Control is almost equally pervasive on the marketing side. The state procurement system is the only effective marketing option for most state and collective farms, and prices are controlled by the state. Secondary marketing channels do, however, exist. These are the farmers' markets and consumer cooperatives, which primarily handle commodities from the household plots of state and collective farmworkers. Since 1986, state and collective farms have been encouraged to make greater use of the consumer cooperatives for marketing their output, but an inadequate infrastructure has hampered such efforts.

Consumers enjoy heavily subsidized prices in the state retail network, from which most food commodities are purchased. Prices in the consumer cooperatives are also controlled, but these are somewhat higher than in the state stores. Prices in farmers' markets are generally uncontrolled and can be as high as four or five times the prices in state stores. Pervasive excess demand for food commodities in the state and cooperative

systems results in informal rationing through queuing for food or through a formal card system. The low consumer prices, particularly in the state retail network, therefore, understate the true cost to consumers because such prices fail to incorporate the time wasted and inconvenience necessary for food purchases.

The influence of the world market is controlled by the state through a set of border measures. First, foreign trade activity is dominated by a system of state-run foreign trade organizations (FTO's) that hold virtual monopoly control over the trade of agricultural commodities. Second, the ruble is not a convertible currency, and access to convertible currencies is tightly controlled by the state. In the last few years, many Soviet enterprises have been given the right to directly engage in foreign trade. But, this has done little to increase the influence of the world market on Soviet agriculture and food industries. Farms are still monitored by the administrative apparatus, adequate hard currency is unavailable, and border taxes greatly reduce any incentive to trade.

Applying the PSE/CSE Approach to the Soviet Union

The distortive effects of government intervention are more pervasive in the USSR than can be captured by the PSE/CSE methodology. Producer prices for agricultural commodities do not reflect social costs because such prices are based on a whole system of administratively set prices that reflect neither opportunity costs nor consumer preferences. Inefficiencies are built into the identified policy transfers, which lower their value to farms. For example, in state subsidization of land improvement, much funding is wasted on inappropriate or ineffective projects. The actual ruble value of these farm subsidies, therefore, is less than their "face value." However, adequate data for some secondary policy transfers, such as energy and water subsidies, were not available for inclusion in this study.

For the consumer, government intervention forces retail markets out of equilibrium, large excess demand exists for many commodities, and thus consumer prices understate actual costs to consumers since many goods are rationed. If retail food markets were in balance, the consumption pattern across commodities would be different. Thus, the PSE's and CSE's are measuring distortions in an already distorted system.

Nevertheless, there is value in measuring PSE's and CSE's for the Soviet Union. Despite the distortions, PSE's and CSE's remain useful indicators of the burden of current agricultural policies by commodity on the state budget. By using a world market benchmark, the PSE's and CSE's provide a measure of who is benefiting more from agricultural policies within the Soviet Union, producers or consumers. By contrasting domestic policies with world market prices, they reflect the obstacles to trade liberalization under the current USSR economic system. Further, though not all market distortions resulting from the administered nature of the Soviet economy can be captured here, the extent of distortion occurring through the price and policy transfer categories included in the PSE/CSE approach are of such a magnitude that they are of interest in their own right. The PSE's and CSE's approximate the scale of the initial shocks to the economy that would occur if the USSR were to liberalize trade.

Calculating PSE's and CSE's for the Soviet Union

The primary information used in calculating Soviet subsidy equivalents included average consumer prices, average producer prices, relevant world trade prices (referred to hereafter as reference prices), and the value of policy transfers to producers. To calculate reference prices, we needed a shadow exchange rate of the ruble with the dollar. This is necessary because the official accounting exchange rate of the Soviet Government is not based on meaningful economic information and greatly overvalues the ruble. Available marketing margin data were used to ensure comparability among consumer, producer, and reference prices. Calculations were made using data for 1986.

Three scenarios were developed. Scenario 1 is the basic calculation of PSE's and CSE's from the 1986 data. Scenarios 2 and 3 were developed to anticipate major changes in prices and in the value of the ruble since 1986. Scenario 2 incorporates higher reference prices for wheat and coarse grains, reflecting the upturn in world prices since 1986/87. Scenario 3 maintains the higher reference prices for the grains and also incorporates a higher ruble-dollar exchange rate (that is, a devalued ruble). Before the results are presented, the mechanics of the various calculation are discussed in some detail.

Comparability of Traded Commodities and Domestic Production

Traded commodities at the stage of entry or exit from the USSR were taken as points of reference in calculating Soviet PSE's and CSE's. Adjustments were made in the available data to improve the comparability of traded and domestically produced commodities. Data on processing and marketing margins were used to adjust available domestic producer and consumer prices to the appropriate point in the marketing chain. For example, farmgate prices for live cattle were adjusted for transportation, processing costs, and the value of byproducts for the purpose of comparing them to import prices of beef. Likewise, consumer prices for beef were adjusted for the value of wholesale and retail trade.

True comparisons between traded commodities and domestically produced commodities are complicated by other factors. The commodity categories can be highly aggregated, masking important differences in product subcategories. Beef and pork, for example, can be significantly differentiated by type of cut and quality of the animal. A category as broad as coarse grains is highly aggregated. Even wheat can be differentiated by a range of quality categories and types. To the extent that quality differences exist between the traded good and the domestically produced good and that these differences are not accounted for, the subsidy estimates will be biased.

Producer Prices

Average farmgate prices for all commodities in this study except wheat, coarse grains, rice, and soybeans were provided directly in material of the State Price Committee (29). The producer price for rice was estimated from base procurement prices exclusive of quality and quantity bonuses (4). The USSR publishes farmgate prices for total grain. Prices for wheat and coarse grains were broken out using this information, base

procurement price information by grain type from (4), and information provided to the Economic Commission for Europe (ECE) of the U.N. on producer prices paid by grain type (5, p. 53). Soybean prices were given in (13, p. 106).

Average farmgate prices reported here were adjusted for relevant transportation and processing margins and the value of byproducts to make them comparable with the corresponding reference price. Data on margins and the value of byproducts came from (22), which provides data for the Russian Republic for 1985. The Russian Republic accounts for nearly half of Soviet agricultural and food production and is usually a good indicator of countrywide agricultural averages. Soviet margins for transportation and processing are lower than those in developed Western economies. This difference results from less extensive processing in the USSR (and thus less value added in the food industry) and also from lower domestic input prices, particularly for energy, than those prevailing in market economies. For poultry and cotton, data on margins and byproducts were not available and were therefore estimated. In some cases, technical conversion factors were needed to make comparable domestic producer prices and reference prices. These included cut-out rates for livestock, ginning rates for cotton, and extraction rates for sugar beets.

Policy Transfers to Producers

Information on policy transfers to producers came from V. N. Semenov, Deputy Minister of Finance responsible for the agro-industrial complex. Table 1 provides basic information on direct producer subsidies used in this study. Soviet subsidy data are not attributed to specific commodities. Fertilizer subsidies were allocated according to average application rates by crop. Land improvement subsidies were allocated based on the share of irrigated and drained land devoted to each crop. For most other subsidies, we relied on the share of gross agricultural production for their allocation by commodity. Subsidies to sown roughage crops were allocated among livestock products according to the share of those crops in livestock rations. (More information on the assumptions used in allocating these subsidies is presented in Appendix A.)

By adding identified producer subsidies to adjusted producer prices, we assumed not only that the ruble value of all subsidies was equal, but that a ruble of any subsidy was equivalent to a ruble increase in producer prices. Because of the clearly low efficiency of some of the subsidy programs, particularly the land improvement programs, the producer price equivalents (and therefore the PSE's) are biased upwards.

The lack of information about some important subsidy categories represents a downward bias in the PSE estimates. For example, credit subsidies to farms are large. It has been the practice of the State Bank and the Agro-Industrial Bank to postpone large sums of debt payments owed by collective and state farms, and this represents a form of credit subsidy. Real interest rates in the USSR are negative, but this is not considered a subsidy to farms because those rates apply across the economy and are not strictly targeted to agriculture.

Table 1--Budgetary allocations to agricultural producers, 1986

Item	Value
	Billion rubles
Capital investments	16.1
Planned expenditure of low-profit collective farms [1]	3.2
Insurance payments for low-profit state farms	1.0
Operational expenditures [2]	3.6
Fertilizer and machinery subsidies	5.5
Other	2.5
Total	31.9

[1] Funds for construction of onfarm housing, roads, and other amenities.
[2] This category includes soil improvement work, pest control, and other expenses.

Source: (20).

No payments were charged farms for water use. One Soviet economist calculates the value of this subsidy at 5.6 billion rubles per year (7, p. 14). Soviet agriculture also benefits from a preferential rate for electricity and coal compared with other sectors of the economy. Data on coal subsidies to agriculture (available only for 1987 and 1988) totaled slightly over 5 billion rubles each year. No attempt has been made in this study to incorporate an estimated coal subsidy for 1986.

Consumer Prices

Estimation of consumer subsidy equivalents was complicated by various factors. First, it was sometimes necessary to define the consumer as an intermediary processor, not as the true final consumer. The consumer of wheat and coarse grain was defined as the state procurement agencies, and that of cotton, as the textile industry. Consumers of oilseeds were defined as both the retail consumer of vegetable oil and the state mixed feed industry for oilseed meal.

A second complication was the number of marketing channels. The state retail network continues to account for a majority of marketed agricultural products in the USSR. In addition, state-administered cooperative outlets account for about one-quarter of marketed food products, and the collective farm markets account for about 5 percent. The farm markets sell food commodities at substantially higher prices. Furthermore, for most of the commodities considered in this study, a sizeable portion (as much as one third of the meats and over half of wheat and coarse grains) is not marketed at all, but is

consumed locally or on the farm. When a farm chooses not to market its production, it loses the opportunity to earn revenue. The value to the farm from own-consumption must therefore be equal to or exceed the producer price which it could receive for its output. The average producer price was used, therefore, as a proxy consumer price for nonmarketed output.

Data on prices and quantities marketed through the farm markets were not available for most commodities. A simplifying assumption used in this study was that production sold through collective farm markets was valued at average producer prices derived for the PSE's. Collective farm market price data are available for a few commodities. Table 2 compares average producer prices and available collective farm market prices. The consumer prices we want to calculate are not retail-level consumer prices, but consumer prices corrected for marketing margins in wholesale and retail trade. This correction parallels that made in the farmgate producer prices and is necessary to ensure comparability among consumer, producer, and reference prices. Subtracting an estimated 20-percent marketing markup for commodities sold on the collective farm markets (reflecting costs of transportation and sale), we find that the collective farm market prices are fairly close to the average producer price for beef and mutton, but diverge somewhat for pork.

Commodity-specific data on quantities marketed through the state and consumer cooperative networks, taken together, were available. Price data were available only for the state retail network and were applied to quantities marketed through both the state and consumer cooperative networks. Average 1986 state retail prices for livestock products were published in (20). Average state retail prices for sugar and vegetable oil were available for the Russian Republic for 1985 (22). State retail prices were then corrected for wholesale and retail marketing markups (22) to make them comparable with the corresponding reference and producer prices.

Table 2--Calculated producer and collective farm market prices for meat

Item	Producer price	Collective farm market price	
		Unadjusted	Minus marketing margin
		Rubles per kilogram	
Beef	4.52	5.02	4.18
Pork	3.13	4.55	3.79
Mutton	4.21	5.06	4.22

Source: Collective farm market prices for December 1987, averaged for 264 cities, APK: Ekonomika, upravleniye, No. 9, 1988, p. 18. Producer prices from PSE calculations.

Establishing consumer prices for the marketed portion of crop commodities other than sugar and vegetable oil was more difficult. The consumer price for the marketed portion of wheat production was based on accounting (rashchetnye) prices utilized by the state procurement organizations (17, p. 147). Much of the price subsidies for grain are paid at the level of procurement. The farmgate prices paid out by procurement organizations greatly exceed the accounting prices at which these organizations are forced to price the grain in internal cost calculations. These accounting prices serve as the basis for further grain and grain product pricing during processing and marketing. The state budget reimburses the procurement organizations for the difference between farmgate and accounting prices. Any taxes assessed or subsidies paid that occur later in the marketing chain are not reflected in our CSE grain estimates for grain. Some grain products, such as groats and rye flour, are also subsidized at the retail level (17, p. 152). Turnover taxes may still be assessed at the retail level for other grain products.

Accounting prices were available for all coarse grains except corn, which was assumed to have an accounting price lower than rye but higher than barley. Resulting producer/consumer price wedges fit well with published data on total grain price subsidies from the budget (table 3). The consumer price for rice was also estimated. The consumer price for cotton was defined as the price paid by the textile industry for ginned cotton. This was estimated based on per ton subsidies for raw cotton in 1980, published data on subsidies to cotton and wool from 1980 to 1986, and an estimated markup for ginning of 30 percent.

Reference Prices

Determination of reference prices requires use of an appropriate exchange rate. Soviet official exchange rates are unacceptable, since no economically meaningful relationship between the ruble and the dollar (or other convertible currencies) is used in their creation. Official rates are used primarily for accounting purposes, and greatly overvalue the ruble. Thus, a shadow exchange rate (SER) between the ruble and the dollar was estimated for this study. The general approach was to determine a relationship between a ruble's worth of resources in the USSR and a dollar's worth of resources (embodied in traded goods) on the world market. This was done by estimating how many rubles of resources the Soviets would have to spend to produce domestically one dollar's worth of imports from hard currency countries. This estimate identifies the value of the resources the Soviets "save" by importing $1 of goods, rather than domestically producing them, and thereby measures the value of the dollar in terms of domestic rubles. Also, in determining the potential cost to the Soviets of domestically producing possible imports, estimates of marginal costs were used. This results in a more desirable "marginal," as opposed to an "average," SER. The main empirical task was estimating the marginal cost of Soviet agricultural production. (See Appendix D for additional explanation of the calculation.)

Because of the difficulty of estimating a valid SER, we used the methods described to compute rates for 1985, 1986, and 1987 and took the average of the three calculations as an estimated SER for 1986. The calculations were 1.51 rubles to the dollar for 1985, 1.95 rubles for 1986, and 2.27 rubles for 1987. This resulted in an average estimate of 1.91 rubles per dollar for 1986. In comparison, the Soviet official exchange rate in 1986

Table 3--Payments from the budget to finance price subsidies for agricultural commodities and fish

Commodity	1970	1975	1980	1985	1986
			Billion rubles		
Livestock and poultry	8.8	12.2	14.0	26.6	27.8
Milk	2.1	4.0	7.5	18.9	19.2
Grain	.8	.6	.8	4.4	4.4
Oilseeds [1]	0	0	0	.7	1.8
Potatoes and vegetables	.2	.7	1.4 [2]	3.0	3.7
Sugar	0	0	0	1.0	1.2
Cotton and wool	1.7	.5	1.7	3.0	3.3
Fish	.2	.2	.2	2.3	1.8
Total	13.8	18.2	25.6	59.9	63.2

[1] Calculated as the difference between "grain and oilseeds" in (20) and "grain" in (19).
[2] (20) gave 1.9, (19) gave 1.4.

Sources: (20, p. 19; 19, p. 35).

was 0.70 rubles to the dollar. Use of our estimated SER in computing PSE's and CSE's greatly reduces the share of subsidies accruing to producers while greatly increasing the subsidy share to consumers.

The reference prices should be free trade prices, without the influence of other countries' subsidy and tax policies. But, USSR trade in some commodities, notably livestock products and sugar, was primarily with other socialist countries in bilateral trade. Reported ruble unit values for such trade may have little correspondence with ruble unit values for hard currency trade or with prevailing world market prices. In addition, in some cases the relevant world trade price was difficult to calculate. For example, in recent years, the USSR has imported livestock products from the European Community (EC) at tremendous discounts. In such cases, reference prices were constructed on exporter country producer price data, rather than average unit values of Soviet imports.

For crops included in this study, reference prices were based on average unit values for Soviet imports from hard-currency countries in 1986. For cotton, an average export unit value to hard-currency countries was used. Commodity-specific discussion is provided in Appendix E. The only crop without adequate trade data was sunflowerseed. Its

reference price was defined as the soybean reference price divided by 1.15, roughly reflecting the U.S. price spread between soybeans and sunflowerseed.

A large share of trade of livestock products was with socialist countries. Ruble values associated with this trade are not equivalent with ruble values associated with hard-currency trade and were not considered reliable bases for determining reference prices. Unfortunately, a large portion of livestock product imports from hard-currency countries were highly subsidized by the exporter and thus do not represent a valid benchmark. Reference prices for livestock products in this study, therefore, were based on average producer prices in relevant West European countries (except mutton, which was based on New Zealand prices). For details see Appendix E.

Results

Calculations of PSE's and CSE's were made for three different scenarios of assumptions. Scenario 1 represents unadjusted calculations based on 1986 data. Scenarios 2 and 3 introduce assumptions to reflect major changes in reference prices and the dollar value of the ruble since 1986. Scenario 2 differs from scenario 1 by allowing higher reference prices for wheat and coarse grains. Scenario 3 maintains the higher grain reference prices and introduces a higher ruble/dollar exchange rate (a devalued ruble). Scenarios 2 and 3 serve, therefore, as tests of the sensitivity of the PSE/CSE calculations to changes in the reference price and exchange rate measures.

Under scenario 1, the USSR is distinguished by relatively high levels of support to both producers and consumers. The total value of producer and consumer subsidies in 1986 for the commodities analyzed total 76 billion rubles. This compares with published figures of total budgetary payments (for both direct transfers to producers and price subsidies) of 95.1 billion rubles to agriculture and the food industry (20). Unidentified producer subsidies account for much of this difference. Part is also accounted for by commodities not included in this study. Nearly 40 billion rubles of identified support went to producers and 36 billion rubles to consumers (tables 4 and 5). Policy transfers to producers, at 22 billion rubles, accounted for most of the total support to producers. Differentials between domestic producer prices and reference prices accounted for another 17 billion rubles. The aggregate level of support to producers (producer subsidies divided by the total value of production) was 26 percent. This is large but not exceptional by international standards (table 6). The aggregate level of support to consumers was 36 percent, one of the largest figures for any country yet analyzed (table 7) (25). Problems arise in drawing comparisons among countries for these aggregate support measures, in part because of lack of complete commodity and policy coverage. Therefore, the rankings in tables 6 and 7 should be considered as indicative rather than absolute.

Of the 14 commodities measured, Soviet consumers were taxed for only 3, sunflowerseed, sugar, and poultry. Taxes on sunflowerseed were due to relatively high retail prices for vegetable oil. Sunflowerseed oil is one of the few food commodities which retained a high turnover tax by 1986. Soybeans are not taxed but are subsidized because

Table 4--Scenario 1: USSR consumer subsidy equivalents (1986)

Item	Units	Beef	Pork	Mutton	Poultry	Butter	Other milk	Cheese	Wheat	Coarse grains	Rice	Cotton	Sugar	Sunflower-seed	Soy-beans	Total
Level of consumption	1000 tons	7615	6022	874	3088	1797	38223	847	103410	111617	1933	2109	13115	5258	2715	--
Consumer price	Rubles/ton	2020	2213	2429	2477	3135	291	2314	125	147	200	2626	698	530	316	--
Cost to consumers	Mil. rubles	15382	13327	2123	7649	5634	11123	1960	12926	16408	387	5538	9154	2787	858	105255
Price gap calculations:																
Reference price	Rubles/ton	3672	2674	3877	1789	4803	474	4213	214	174	275	3260	435	375	431	--
Consumer price	Rubles/ton	2020	2213	2429	2477	3135	291	2314	125	147	200	2626	698	530	316	--
Calculated price gap	Rubles/ton	1652	461	1448	-688	1668	183	1899	89	27	75	634	-263	-155	115	--
Value of price gap	Mil. rubles	12580	2776	1266	-2125	2997	6995	1608	9203	3014	145	1337	-3449	-815	312	35845
CSE (per unit value)	Percent	81.8	20.8	59.6	-27.8	53.2	62.9	82.1	71.2	18.4	37.5	24.1	-37.7	-29.2	36.4	34.1
CSE (per unit quantity)	Rubles/kg	1.65	0.46	1.45	-0.69	1.67	0.18	1.90	0.09	0.03	0.08	0.63	-0.26	-0.16	0.12	--

-- = Not applicable.

Table 5--Scenario 1: USSR producer subsidy equivalents (1986)

Item	Units	Beef	Pork	Mutton	Poultry	Other milk	Eggs	Wheat	Coarse grains	Rice	Cotton	Sugar	Sunflower-seed	Soy-beans	Butter	Cheese	Total
Level of production	1000 tons	7370	5822	849	2913	38223	4436	87910	100617	2340	2613	8260	5258	703	1612	837	--
Producer price	Rubles/ton	4521	3127	4211	3004	428	1765	145	180	400	2967	779	275	450	9194	5059	--
Value to producers	Mil. rubles	33320	18205	3575	8751	16359	7830	12747	18111	936	7753	6435	1446	316	14821	4234	154839
Price gap calculation:																	
Producer price	Rubles/ton	4521	3127	4211	3004	428	1765	145	180	400	2967	779	275	450	9194	5059	--
Reference price	Rubles/ton	3672	2674	3877	1789	474	1400	214	174	275	3260	435	375	431	4803	4213	--
Price gap	Rubles/ton	849	453	334	1215	-46	365	-69	6	125	-293	344	-100	19	4391	846	--
Value of price gap	Mil. rubles	6257	2637	284	3539	-1758	1619	-6066	604	293	-766	2841	-526	13	7078	708	16758
Policy transfers:																	
Fertilizer subsidies	Mil. rubles	281	0	33	0	124	0	429	611	14	136	151	21	4	144	20	1967
Machinery subsidies	Mil. rubles	218	0	25	0	96	0	442	436	31	191	128	40	9	111	16	1743
Irrigation construction	Mil. rubles	1509	0	174	0	662	0	0	1436	280	1566	59	27	0	770	108	6593
Drainage construction	Mil. rubles	256	0	30	0	112	0	259	358	0	0	23	0	0	130	18	1186
Building subsidies	Mil. rubles	1327	664	137	322	708	317	231	227	16	99	67	22	5	820	117	5078
Land improvement	Mil. rubles	153	0	18	0	67	0	310	306	22	134	90	28	6	78	11	1223
Operation of irrigation	Mil. rubles	181	0	21	0	79	0	0	172	34	188	7	3	0	92	13	791
Veterinary subsidies	Mil. rubles	87	44	9	21	47	21	0	0	0	0	0	0	0	54	8	290
Pest control	Mil. rubles	0	0	0	0	0	0	27	27	2	12	8	2	1	0	0	79
Crop insurance subsidies	Mil. rubles	153	0	18	0	67	0	310	306	22	134	90	28	6	78	11	1223
Social investment	Mil. rubles	495	248	50	119	264	119	231	228	17	99	66	20	5	307	43	2308
Total policy transfers	Mil. rubles	4662	955	513	462	2226	457	2239	4107	437	2559	689	192	35	2585	365	22482
Total value of subsidies	Mil. rubles	10919	3592	797	4001	468	2076	-3827	4711	730	1793	3530	-334	48	9664	1073	39241
PSE (per unit value)	Percent	32.8	19.7	22.3	45.7	2.9	26.5	-30.0	26.0	78.0	23.1	54.9	-23.1	15.3	65.2	25.3	25.6
PSE (per unit quantity)	Rubles/kg	1.48	0.62	0.94	1.37	0.01	0.47	-0.04	0.05	0.31	0.69	0.43	-0.06	0.07	5.99	1.28	--

-- = Not applicable.

meal prices charged to the mixed feed industry are low and the ratio of meal to oil for soybeans is much higher than for sunflowerseed. Soviet producers of sugar are high cost by world standards. Here, too, Soviet consumers are taxed relative to world prices, although by 1986 domestic turnover taxes were no longer significant.

Support to consumers for meat varied greatly by type. Relative prices at the retail level in the USSR for beef, pork, and poultry are the reverse of those common in market economies. Poultry prices are the highest and exceed the reference price. Beef prices are the lowest and represent very large consumer subsidies relative to the reference price. Milk products are similarly low-priced and subsidized.

Support levels were high for the grains and cotton. For coarse grains, the import price for French barley was used as the reference price because barley is far and away the most important coarse grain produced in the USSR. For wheat, the reference price was the average price of all wheat imports in 1986. The quality of imported wheat exceeds that of the average quality of Soviet wheat but is probably close to the quality of wheat actually procured by the state, which is what the farmgate price represents.

Because the consumer of cotton is defined as the textile industry, the estimated CSE's do not represent the situation facing the final consumer. Large turnover taxes at the retail level or inefficiencies in the Soviet textile industry could mean that the final consumer is subsidized to a much lesser extent or is actually taxed.

Producers of all but two commodities were subsidized in the USSR. But, wheat and sunflowerseed producers were taxed despite sizeable direct producer subsidies, particularly for wheat. Soviet producer prices are regionally differentiated and based on average cost in each region. Because production of these two commodities tends to be concentrated in relatively low-cost production regions, producer prices for these commodities are also low.

Large direct producer subsidies, attributable primarily to land improvement and other onfarm construction, were an important factor in certain PSE's, particularly for grains, cotton, and livestock products. Subsidies associated with sown roughage crops were attributed to beef and milk production. Subsidy levels for crops are highest for rice and sugar production.

Producer subsidies for meat ranged between 20 and 50 percent of the value of production. Poultry meat received the highest level of support among the meats. Soviet poultry meat production remains inefficient in terms of feed requirements and average rate of gain. The domestic producer price of poultry is two-thirds that for beef within the USSR (on a carcass-weight basis), compared with less than one-half as measured in reference prices. Domestic price ratios of pork to beef are very close to the reference price ratios. The higher PSE for beef compared with pork is due to higher direct producer subsidies.

Widely differing subsidy estimates were obtained for the various milk products. Calculations for butter are considered the most reliable among the milk products because of product homogeneity and the availability of price data. Of the major commodities

analyzed, butter had the highest level of producer subsidies. Price differentials between butter and cheese in the USSR are much greater than the differential in reference prices of these two products. (These reference prices are based on producer prices for West European countries. See Appendix E for more explanation). A problem with cheese is the variety of products under this label. We attempted to construct a cheese reference price with this in mind, though the quality of the Soviet product could well be lower than implied in our assumptions. If so, the PSE for cheese is understated. To calculate the PSE for "other milk," we used fluid milk producer and reference prices. In this case, Soviet producer prices were lower than the reference price. However, virtually no international trade in fluid milk exists as such, so comparison of these prices is questionable.

International Comparisons

The USSR represents a unique case of very large levels of simultaneous support to producers and consumers. The usual developed-country pattern, as reflected by the United States, shows large Government subsidies to producers while consumers of agricultural commodities are taxed. This pattern is particularly exaggerated in Japan. Developing countries exhibit a variety of subsidy/tax patterns. China and Pakistan demonstrate the opposite of the developed-country pattern with producer taxation and consumer subsidies. Some developing countries follow the developed-country pattern, as Taiwan does, though not all such nations are newly industrialized. The only other example of simultaneous subsidization of both producers and consumers is Poland, though the level of subsidies to producers is considerably lower there than in the USSR. Of the countries thus far studied, the Soviet aggregate consumer subsidy equivalent of 35.7 percent is surpassed only by those of China and Poland.

This degree of subsidization of agricultural commodities represents a major burden on the rest of the Soviet economy. Subsidies measured for the commodities in this report equal 76 billion rubles. Total gross subsidies to the agro-food sector reportedly were 95.1 billion rubles in 1986 (table 8). The 19-billion ruble difference occurs because not all agricultural commodities are included in this study, and not all direct policy transfers to producers have been identified. Total gross subsidies to the agro-food sector represented 12 percent of the gross national product (GNP) in 1986.

Net budgetary subsidies to the agro-food sector in 1986 were probably only about half of the 95.1 billion rubles of gross subsidies, or about 45 billion rubles. The state budget earns revenue from the agro-industrial sector primarily through the turnover tax on alcoholic beverages and profit taxes from food industry and trade enterprises. Soviet farms make little contribution to state budget revenues (2). Net subsidies to the agro-food sector in 1986 were roughly equal to the State budget deficit that year of 45 billion rubles.

A straight comparison of aggregate PSE's and CSE's of the Soviet Union and developed countries understates the relative burden of these subsidies to the Soviet economy, because of the relatively large share of the Soviet economy still accounted for by agriculture.

Table 6--International comparison of aggregate PSE's for 1986

Country	Aggregate PSE	Country	Aggregate PSE
Japan	78	**USSR**	26
South Korea	59	Taiwan	25
Mexico	53	Australia	12
EC-10	48	Poland	7
Yugoslavia	47	India	5
Canada	43	Egypt	-20
Chile	39	Pakistan	-25
United States	36	China	-46
Brazil	32		

Source: (25).

Table 7--International comparisons of aggregate CSE's for 1986

Country	Aggregate CSE	Country	Aggregate CSE
China	59	EC-10	-20
Poland	50	Mexico	-27
USSR	36	Taiwan	-31
Pakistan	18	Yugoslavia	-44
India	1	Japan	-49
United States	-11	South Korea	-59
Canada	-15		

Source: (25).

Table 8--Budgetary subsidies to the agro-industrial complex, 1986-90

Category	1986	1987	1988 revised plan	1989 plan	1990 plan
			Billion rubles		
Price subsidies	53.2 [1]	54.0	53.6	55.6	61.9
Price bonuses for low-profit farms	10.0 [1]	10.9	1.7	0	0
Differential price bonuses	0	0	22.1	32.2	33.1
Input subsidies	5.5	5.8	2.1	0	0
Investment subsidies	16.1	16.2	12.8	13.1	13.3
Other expenditures	10.3	11.9	7.0	7.5	8.2
Total [2]	95.1	98.8	99.3	108.4	116.5

[1] Estimated breakout based on 63.2 billion rubles for price subsidies and bonuses for low-profit farms.

[2] There is indication that price subsidies for coal used in agriculture were introduced in recent years. Data from Argumenty i fakty, No. 37, 1989, indicate coal subsidies of 5.1 billion rubles in 1987 and 5.4 rubles in 1988. These are not included in the totals here. Data for coal subsidies for other years are not available.

Sources: (21, p. 12; 20, pp. 19, 21; 14, pp. 37-49).

Developments Since 1986

All three of the primary price components of this study--consumer, producer, and reference prices--have been affected by accelerating inflation in the Soviet economy. In current rubles, the level of support to commodities covered in this paper has increased since 1986. Higher producer prices were enacted for sunflowerseed in 1987 and for grain in 1988. Increases in sunflowerseed producer prices were large enough to eliminate the tax that had existed in 1986 on production of this crop. Direct subsidies for fertilizer, machinery, some rural construction, and the category of "social investment" were

eliminated in 1988/89 and replaced by across-the-board increases in producer prices. This restructuring of subsidies and prices resulted in a net increase in budgetary payments to producers.

The restructuring of producer subsidies is part of a move to "self-financing" in agriculture, through which the Soviets hope to achieve better cost-accounting at the farm and local level (3). In 1986, certain subsidies were not identifiable, including credit and other direct financial subsidies. With the move to self-financing, these subsidies are likely to be increasingly expressed as higher producer prices, and therefore identifiable by the approach used here. Pressure has mounted within the USSR since 1986 to greatly curtail subsidies for irrigation and drainage work. Budgetary responsibility for such work is passing from the All-Union level down to the various republics. It is expected that the republics will make more careful use of these funds and that the amount of irrigation and drainage system construction (and associated subsidies) will decline.

Available data indicate upward movement in consumer prices for agricultural commodities since 1986. The official index of prices for the state retail network showed a 5-percent increase in food prices in 1987, but no increase in 1988. Retail price increases for food resumed in 1989, but the official index figure is not yet available. Information on expenditures from the budget supports the view that the overall level of support to the agro-food sector in current rubles has increased since 1986, including a growing wedge between producer and consumer prices (table 8).

Between 1986 and 1989, the average free on board (f.o.b.) gulf port price for U.S. wheat increased by nearly 40 percent and for U.S. corn by nearly 30 percent. Scenario 2 was established to capture the effect of higher reference prices for wheat and coarse grain. The resulting PSE's and CSE's are shown in tables 9 and 10. Consumer subsidies for these two commodities increase significantly in this scenario, and the value of the aggregate CSE (even though all other commodities are unchanged from the 1986 calculations) increases from 35.7 percent to 47.4 percent.

Also as part of scenario 2, Soviet producer prices for wheat and coarse grain were increased by 10 percent. Producer prices for sunflowerseed were raised by 50 percent in 1987, and this increase is reflected in scenario 2. The increase in reference prices dwarfs increases in domestic producer prices. The tax on Soviet wheat producers becomes exceptionally large, and the subsidy for Soviet coarse grain producers virtually disappears. The value of the aggregate PSE (calculations for all other commodities unchanged) falls from 26 percent to 19.5 percent.

The increasing tax on wheat producers since 1986 coincides with growing popular opposition within the USSR to continued large imports of wheat. Unfavorable price ratios between wheat and mixed feed, combined with other disincentives, have led many farms in the USSR to use as feed significant amounts of milling quality wheat, which in turn have boosted imports of wheat from hard-currency sources. In August 1989, the Government announced a new limited program of hard currency payment for the procurement of durum and other high-quality wheat. Soviet farms are now eligible to receive hard currency for high-quality wheat if they satisfy a number of preconditions.

Table 9--Scenario 2: USSR consumer subsidy equivalents with higher grain reference prices

Item	Units	Beef	Pork	Mutton	Poultry	Butter	Other milk	Cheese	Wheat	Coarse grains	Rice	Cotton	Sugar	Sunflower-seed	Soybeans	Total
Level of consumption	1000 tons	7615	6022	874	3088	1797	38223	847	103410	111617	1933	2109	13115	5258	2715	--
Consumer price	Rubles/ton	2020	2213	2429	2477	3135	291	2314	125	147	200	2626	698	530	316	--
Cost to consumers	Mil. rubles	15382	13327	2123	7649	5634	11123	1960	12926	16408	387	5538	9154	2787	858	105255
Price gap calculations:																
Reference price	Rubles/ton	3672	2674	3877	1789	4803	474	4213	295	225	275	3260	435	375	431	--
Consumer price	Rubles/ton	2020	2213	2429	2477	3135	291	2314	125	147	200	2626	698	530	316	--
Calculated price gap	Rubles/ton	1652	461	1448	-688	1668	183	1899	170	78	75	634	-263	-155	115	--
Value of price gap	Mil. rubles	12580	2776	1266	-2125	2997	6995	1608	17580	8706	145	1337	-3449	-815	312	49914
CSE (per unit value)	Percent	81.8	20.8	59.6	-27.8	53.2	62.9	82.1	136.0	53.1	37.5	24.1	-37.7	-29.2	36.4	47.4
CSE (per unit quantity)	Rubles/kg	1.65	.46	1.45	-.69	1.67	.18	1.90	.17	.08	.08	.63	-.26	-.16	.12	--

-- = Not applicable.

Table 10--Scenario 2: USSR producer subsidy equivalents with higher grain reference prices

Item	Units	Beef	Pork	Mutton	Poultry	Other milk	Eggs	Wheat	Coarse grains	Rice	Cotton	Sugar	Sunflower-seed	Soy-beans	Butter	Cheese	Total
Level of production	1000 tons	7370	5822	849	2913	38223	4436	87910	100617	2340	2613	8260	5258	703	1612	837	--
Producer price	Rubles/ton	4521	3127	4211	3004	428	1765	160	198	400	2967	779	415	450	9194	5059	--
Value to producers	Mil. rubles	33320	18205	3575	8751	16359	7830	14022	19922	936	7753	6435	2182	316	14821	4234	158660
Price gap calculation:																	
Producer price	Rubles/ton	4521	3127	4211	3004	428	1765	160	198	400	2967	779	415	450	9194	5059	--
Reference price	Rubles/ton	3672	2674	3877	1789	474	1400	295	225	275	3260	435	375	431	4803	4213	--
Price gap	Rubles/ton	849	453	334	1215	-46	365	-136	-27	125	-293	344	40	19	4391	846	--
Value of price gap	Mil. rubles	6257	2637	284	3539	-1758	1619	-11912	-2717	293	-766	2841	210	13	7078	708	8328
Policy transfers:																	
Fertilizer subsidies	Mil. rubles	281	0	33	0	124	0	429	611	14	136	151	21	4	144	20	1967
Machinery subsidies	Mil. rubles	218	0	25	0	96	0	442	436	31	191	128	40	9	111	16	1743
Irrigation construction	Mil. rubles	1509	0	174	0	662	0	0	1436	280	1566	59	27	0	770	108	6593
Drainage construction	Mil. rubles	256	0	30	0	112	0	259	358	0	0	23	0	0	130	18	1186
Building subsidies	Mil. rubles	1327	664	137	322	708	317	231	227	16	99	67	22	5	820	117	5078
Land improvement	Mil. rubles	153	0	18	0	67	0	310	306	22	134	90	28	6	78	11	1223
Operation of irrigation	Mil. rubles	181	0	21	0	79	0	0	172	34	188	7	3	0	92	13	791
Veterinary subsidies	Mil. rubles	87	44	9	21	47	21	0	0	0	0	0	0	0	54	8	290
Pest control	Mil. rubles	0	0	0	0	0	0	27	27	2	12	8	2	1	0	0	79
Crop insurance subsidies	Mil. rubles	153	0	18	0	67	0	310	306	22	134	90	28	6	78	11	1223
Social investment	Mil. rubles	495	248	50	119	264	119	231	228	17	99	66	20	5	307	43	2308
Total policy transfers	Mil. rubles	4662	955	513	462	2226	457	2239	4107	437	2559	689	192	35	2585	365	22482
Total value of subsidies	Mil. rubles	10919	3592	797	4001	468	2076	-9673	1390	730	1793	3530	402	48	9664	1073	30811
PSE (per unit value)	Percent	32.8	19.7	22.3	45.7	2.9	26.5	-69.0	7.0	78.0	23.1	54.9	18.4	15.3	65.2	25.3	19.4
PSE (per unit quantity)	Rubles/kg	1.48	.62	.94	1.37	.01	.47	-.11	.01	.31	.69	.43	.08	.07	5.99	1.28	--

-- = Not applicable.

First, production of all grain on the farm must exceed average production for 1981-85. Second, sales of all grain from the farm must exceed the average of sales for 1981-85. Once those conditions are satisfied, wheat of sufficiently high quality can be sold for hard currency.

Prior to the adoption of this hard-currency program, farms had only one marketing option--to sell above-quota wheat for rubles. Under this traditional marketing channel, farms qualified for ruble bonuses when selling wheat above their quota. Table 11 provides information on the traditional ruble versus new hard-currency payment options, from which one can derive implicit dollar/ruble exchange rates.

The implicit ruble/dollar exchange rates for durum wheat fall within the range of 4.47-4.85. The implicit exchange rates for bread wheats fall within the range of 2.97-3.31 rubles to the dollar. For our estimations of 1986 PSE's and CSE's, we calculated a shadow exchange rate of 1.91 rubles per dollar. Since 1986, inflationary pressures have grown dramatically in the USSR, and the dollar value of the ruble has in fact declined.

Hungary and Poland have established commercial exchange rates between their domestic currencies and the ruble, the dollar, and other currencies at rates that Western experts believe have economic meaning. Cross-exchange rates between the ruble and the dollar for late 1988 computed from these commercial rates give about 2-2.3 rubles to the dollar (16), a range which contains our estimate for 1987 of 2.27 rubles per dollar.

A decline in the value of the ruble, other things being constant, increases the reference prices, shifting more support from producers to consumers. The estimates for 1986, therefore, would overstate the current level of support to producers and understate support to consumers, moving the USSR more in the direction of the developing country pattern.

Tables 12 and 13 provide calculations from scenario 3. This scenario incorporates the higher reference and producer prices for wheat and coarse grain and introduces a lower value of the ruble compared with 1986. In this third scenario, the ruble/dollar exchange rate is increased to 2.5 from the 1.91 used in scenarios 1 and 2. The impact of the devalued ruble on the support estimates is sizeable. The new, higher reference prices result in Soviet producers being taxed despite the large direct transfers to producers. The aggregate PSE is now -10 percent. Of particular interest is wheat, which is very heavily taxed under this scenario (PSE of -126.1 percent). Compensation to Soviet wheat producers is less than half of that inferred by the reference price. Excluding wheat, the remaining commodities are subsidized to a very small extent. Butter, sugar, and rice continue to have PSE's in excess of 30 percent. Nevertheless, it is possible that, due to the inability to capture certain producer subsidies, Soviet agricultural producers in fact remain subsidized in the aggregate even under this scenario.[2]

[2] A rough calculation shows that the value of coal, water, and credit subsidies not included in our calculations is large enough to compensate for producer taxes identified under this scenario.

Table 11--Deriving implicit ruble/dollar exchange rates for selected grain types

Grain types	Convertible ruble prices	Dollar value of convertible rubles [1]	Nonconvertible ruble prices [2]	Implicit exchange rate
	Rubles per ton	Dollars per ton	---Rubles per ton---	
Bread wheats:				
I Class (sil'naya)	60	93.00	276	2.97
II Class (sil'naya)	50	77.50	236	3.05
III Class (tsennaya)	40	62.00	205	3.31
Durum wheat:				
I Class	80	124.00	563	4.54
II Class	65	100.75	450	4.47
III Class	45	69.75	338	4.85

[1] Converted at $1.55 per convertible ruble. Based on official exchange rates in Moscow Narodny Bank Limited; Press Bulletin, No. 1026, Sept. 20, 1989.

[2] These are prices for grain sales above the 1981-85 average (that is, base price plus quantity bonuses). Sales above this average is a requirement for receiving payment in convertible rubles.

Note: Most bread wheat qualifying for bonuses is Class III (tsennaya).

Table 12--Scenario 3: USSR consumer subsidy equivalents with higher grain reference prices and a devalued ruble

Item	Units	Beef	Pork	Mutton	Poultry	Butter	Other milk	Cheese	Wheat	Coarse grains	Rice	Cotton	Sugar	Sunflower-seed	Soybeans	Total
Level of consumption	1000 tons	7615	6022	874	3088	1797	38223	847	103410	111617	1933	2109	13115	5258	2715	--
Consumer price	Rubles/ton	2020	2213	2429	2477	3135	291	2314	125	147	200	2626	698	530	316	--
Cost to consumers	Mil. rubles	15382	13327	2123	7649	5634	11123	1960	12926	16408	387	5538	9154	2787	858	105255
Price gap calculations:																
Reference price	Rubles/ton	4807	3500	5075	2342	6287	620	5515	386	295	360	4267	569	491	564	--
Consumer price	Rubles/ton	2020	2213	2429	2477	3135	291	2314	125	147	200	2626	698	530	316	--
Calculated price gap	Rubles/ton	2787	1287	2646	-135	3152	329	3201	261	148	160	1641	-129	-39	248	--
Value of price gap	Mil. rubles	21220	7752	2313	-417	5664	12593	2711	27006	16466	309	3462	-1686	-206	674	97861
CSE (per unit value)	Percent	138.0	58.2	108.9	-5.5	100.5	113.2	138.3	208.9	100.4	80.0	62.5	-18.4	-7.4	78.5	93.0
CSE (per unit quantity)	Rubles/kg	2.79	1.29	2.65	-.14	3.15	.33	3.20	.26	.15	.16	1.64	-.13	-.04	.25	--

-- = Not applicable.

Table 13--Scenario 3: USSR producer subsidy equivalents with higher grain reference prices and a devalued ruble

Item	Units	Beef	Pork	Mutton	Poultry	Other milk	Eggs	Wheat	Coarse grains	Rice	Cotton	Sugar	Sunflower-seed	Soy-beans	Butter	Cheese	Total
Level of production	1000 tons	7370	5822	849	2913	38223	4436	87910	100617	2340	2613	8260	5258	703	1612	837	--
Producer price	Rubles/ton	4521	3127	4211	3004	428	1765	160	198	400	2967	779	415	450	9194	5059	--
Value to producers	Mil. rubles	33320	18205	3575	8751	16359	7830	14022	19922	936	7753	6435	2182	316	14821	4234	158660
Price gap calculation:																	
Producer price	Rubles/ton	4521	3127	4211	3004	428	1765	160	198	400	2967	779	415	450	9194	5059	--
Reference price	Rubles/ton	4807	3500	5075	2342	620	1833	386	295	360	4267	569	491	564	6287	5515	--
Price gap	Rubles/ton	-286	-373	-864	662	-192	-68	-227	-97	40	-1300	210	-76	-114	2907	-456	--
Value of price gap	Mil. rubles	-2105	-2173	-734	1929	-7357	-300	-19925	-9712	94	-3398	1731	-399	-80	4686	-382	-38125
Policy transfers:																	
Fertilizer subsidies	Mil. rubles	281	0	33	0	124	0	429	611	14	136	151	21	4	144	20	1967
Machinery subsidies	Mil. rubles	218	0	25	0	96	0	442	436	31	191	128	40	9	111	16	1743
Irrigation construction	Mil. rubles	1509	0	174	0	662	0	0	1436	280	1566	59	27	0	770	108	6593
Drainage construction	Mil. rubles	256	0	30	0	112	0	259	358	0	0	23	0	0	130	18	1186
Building subsidies	Mil. rubles	1327	664	137	322	708	317	231	227	16	99	67	22	5	820	117	5078
Land improvement	Mil. rubles	153	0	18	0	67	0	310	306	22	134	90	28	6	78	11	1223
Operation of irrigation	Mil. rubles	181	0	21	0	79	0	0	172	34	188	7	3	0	92	13	791
Veterinary subsidies	Mil. rubles	87	44	9	21	47	21	0	0	0	0	0	0	0	54	8	290
Pest control	Mil. rubles	0	0	0	0	0	0	27	27	2	12	8	2	1	0	0	79
Crop insurance subsidies	Mil. rubles	153	0	18	0	67	0	310	306	22	134	90	28	6	78	11	1223
Social investment	Mil. rubles	495	248	50	119	264	119	231	228	17	99	66	20	5	307	43	2308
Total policy transfers	Mil. rubles	4662	955	513	462	2226	457	2239	4107	437	2559	689	192	35	2585	365	22482
Total value of subsidies	Mil. rubles	2557	-1218	-221	2391	-5131	157	-17686	-5605	531	-839	2420	-207	-45	7271	-17	-15642
PSE (per unit value)	Percent	7.7	-6.7	-6.2	27.3	-31.4	2.0	-126.1	-28.1	56.7	-10.8	37.6	-9.5	-14.3	49.1	-0.4	-9.9
PSE (per unit quantity)	Rubles/kg	.35	-.21	-.26	.82	-.13	.04	-.20	-.06	.23	-.32	.29	-.04	-.06	4.51	-.02	--

-- = Not applicable.

Support to consumers skyrockets under this scenario. The aggregate CSE reaches 93 percent, an incredibly high level. Domestic consumer prices are half or less of the corresponding reference prices for 7 of the 14 commodities studied. For wheat, the consumer price is less than one-third the reference price. Because this study calculates consumer prices as a weighted average of state retail trade and other consumption, the degree of consumer subsidization within the state retail network is implied as even higher than indicated by the CSE's in table 13. If we accept the reference prices as rough indicators of equilibrium prices after trade liberalization, prices for food commodities in the state retail network would have to increase two to three times if full integration into the world economy is desired.

Conclusions

Application of the PSE/CSE approach to the Soviet Union requires some conceptual qualification. The calculation of subsidy equivalents was originally designed to measure the extent to which government intervention distorted domestic markets. Implicit in the PSE/CSE approach is a market economy that is in equilibrium. In the absence of government intervention, the economy behaves as theory would predict. This is clearly not the case for the USSR. Administrative interference in resource allocation, that is, the lack of balanced and developed markets for inputs and outputs, means that the underlying basis of the Soviet economy does not satisfy the PSE/CSE assumptions. The categories which are included in the PSE and CSE calculations for the USSR (discrepancies between domestic prices and reference prices and the value of policy transfers to producers) represent, therefore, only a partial measure of the extent to which the administered economy in the USSR differs from a market economy.

Although incomplete, the PSE's and CSE's nevertheless capture important information about the degree of market distortions. The PSE's and CSE's effectively measure the costs to Soviet producers and consumers of trade liberalization if no other market reform were made in the domestic economy. The sheer magnitude of the pricing and policy transfer distortions is such that they could well overshadow other distortions not captured here. Even if the USSR were to initiate a move to a free market economy, the PSE's and CSE's probably would reflect the magnitude of an initial shock of trade liberalization. The scale of measured Government support to producers and consumers of agricultural commodities in the USSR is substantial. In 1986, 95.1 billion rubles, or 12 percent of the GNP, were allocated for this purpose. This study identifies 75 billion rubles of support; the difference is due to commodities not included in the study and to policy transfers to producers that could not be adequately identified.

Under scenario 1 (calculation of PSE's and CSE's from 1986 data), support is divided almost evenly between consumers and producers. Consumers receive 36 billion rubles of support, and producers, 39 billion. The aggregate CSE for all commodities (total support divided by the total value of consumption) was 34 percent, while the aggregate PSE was 26 percent. In comparison with subsidy equivalent calculations for other countries, these are unprecedentedly high levels of simultaneous support to producers *and* consumers. Soviet consumers are subsidized for all commodities except sugar, sunflowerseed (vegetable oil), and poultry meat. Support levels are particularly high for wheat, dairy

products, beef, and mutton. Soviet producers are subsidized for all commodities except wheat and sunflowerseed, with the highest levels of support for butter, sugar, rice, poultry meat, and beef.

To simulate significant economic changes since 1986, two additional scenarios were constructed based on the 1986 data in scenario 1. In scenario 2, reference and producer prices were increased for wheat and coarse grain, and the producer price for sunflowerseed was increased. Because of the large increase in grain reference prices, the level of support for Soviet consumers increased and that accruing to producers declined compared with scenario 1. The aggregate CSE increased to 47 percent, and the aggregate PSE fell to 19 percent.

Maintaining these price changes and incorporating a devalued ruble resulted in another set of calculations (scenario 3). With an increase in the ruble/dollar exchange rate from 1.91 to 2.5, the aggregate CSE skyrocketed to 93 percent, an unprecedentedly high level, while the aggregate PSE fell to -10 percent. Under this scenario, taxes to Soviet wheat producers became particularly large (126 percent), while subsidies to wheat consumers reached 209 percent.

The shock to the Soviet economy of adoption of full trade liberalization would be substantial. Scenario 3 comes closest to reflecting the current situation in the USSR. It indicates that Soviet agricultural producers may be competitive on world markets, since average producer prices under this scenario are below world prices. Whether Soviet farms would be competitive in terms of marginal costs is more uncertain.

The impact of full trade liberalization on Soviet consumers would be substantial. Under scenario 3, consumer prices for agricultural commodities would have to almost double. And because the consumer prices calculated for this study are weighted averages of retail prices and nonmarketed production valued at much higher producer prices, increases in the state retail network would have to more than double. Consumer prices in state stores for some commodities would probably have to triple to be consistent with full trade liberalization. Recent discussion in the USSR indicates that, though movement of domestic prices toward world prices is a goal, domestic prices for agricultural commodities will continue to be insulated. As long as consumer prices remain subsidized to such an extent, little hope exists of reversing the continued increase in excess demand for food commodities in the USSR.

Moreover, undesirable implications arise for the entire financial system in the USSR if retail price subsidies are not reduced. In recent years, the state budget deficit in the Soviet Union has reached 10 percent of the GNP, compared with about 3 percent in the United States. Virtually all of the Soviet deficit has been financed through money creation, with direct inflationary impacts. Gross payments from the state budget to maintain retail price subsidies and the policy transfer programs to producers have climbed to 116 billion rubles in 1990 compared with the 95 billion rubles in 1986, cited above. The state budget receives some revenue from the agro-food sector, mostly in the form of turnover taxes on alcoholic beverages. But, such revenue covers barely half of budgetary payments to this sector. Net budgetary payments to the agro-food sector were roughly 45 billion rubles in 1986, or over 5 percent of GNP. Such payments are likely to

have increased slightly since, making the agro-food sector a substantial contributor to the overall budget deficit. If that deficit is to be significantly trimmed, cuts in agricultural and food subsidies are indispensable.

The importance of the exchange rate in determining whether consumers or producers benefit from the subsidy programs was demonstrated in scenario 3. Calculations in scenario 3 imply that Soviet producers may face less pressure from world markets following a trade liberalization than is usually assumed. The sensitivity of the PSE's and CSE's to changes in the exchange rate underscores the need to fully update those calculations beyond 1986. This work is now being carried forward by USDA's Economic Research Service.

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Appendix A: Allocating Direct Producer Subsidies by Commodity

Direct producer subsidies include those on inputs and investments, as well as operational expenses. These subsidies are allocated by commodity based upon available information.

Input Subsidies

Data on subsidies to fertilizer and machinery of 5.5 billion rubles for 1986 were provided by Deputy Minister of Finance V.N. Semenov in (20, p. 21). Fertilizer subsidies were calculated based on information on per ton subsidies. Semenov (18, p. 111) also gives 1983 per ton fertilizer subsidies of 91.63 rubles. In 1988 and 1989, these fertilizer subsidies were eliminated. But, in another source (21), Semenov states that fertilizer subsidies in 1989 would have been 3.2 billion rubles if they had not been removed. Given 1988 delivery amounts, this implies per ton subsidies of 106-114 rubles per ton. For 1986, we estimated per ton fertilizer subsidies of 100 rubles, resulting in total fertilizer subsidies of 2.65 billion rubles. These were allocated by crop, based on average application rates. Applications by grain type were estimated to fit with published data on application to all small grains. Application of fertilizer to feed crops was allocated to livestock products by the coefficients for livestock product shares of feed crops presented below. Machinery subsidies were the residual of input subsidies minus fertilizer subsidies, or 2.85 billion rubles. They were attributed to crops according to gross value of crop production (feed crops included).

Investment Subsidies

Such subsidies totaled 16.1 billion rubles in 1986. The greater share of investment subsidies was accounted for by land improvement. During 1981-85, total subsidies to land improvement projects were 40 billion rubles, an annual average of 8 billion. In 1988, 10.3 billion rubles were allocated from the budget to pay for land improvement projects (8, p. 11). We assumed such subsidies in 1986 to be 10 billion rubles, three-quarters of which were allocated to irrigation and one-quarter to drainage. Subsidies were allocated by crop based on share of area irrigated or drained.

The USSR does not publish data on irrigated area for all the crops considered in this study. Data were, however, given for irrigated grain area. All rice was here assumed to be irrigated, and the remaining irrigated area was assumed to be allocated to coarse grain. All cotton was assumed irrigated. Sugarbeet and sunflowerseed irrigated area was calculated by taking production from irrigated fields divided by yields from those fields. Irrigated feed crop area was allocated to livestock products by the coefficients for livestock product shares of feed crops. The same process was followed for drained land. One-quarter of drained area of grain was allocated to wheat and three-quarters to coarse grains.

The remaining amount of capital investments, 6.1 billion rubles, was attributed to livestock housing and other structures. Eighty percent of this was allocated to livestock commodities, according to commodity shares of gross livestock production, and 20 percent to crops, according to shares of gross crop production.

Operational Expenditures

These expenditures include a number of production assistance programs. Detailed information was published for 1983 on these individual programs (17). Overall expenditures for all operational programs taken together were also published for 1986, virtually unchanged from the 1983 overall figure, so the detailed 1983 data were utilized unadjusted. Among operational expenditures were the following:

Land Improvement. This category includes liming, gypsum, and peat applications, field leveling, and the like. It was allocated to crops based on share of gross agricultural production.

Operation of Irrigation Systems. These are subsidies that cover the actual operation of completed systems. They were allocated in the same way as irrigation construction.

Veterinary Work. Veterinary work was allocated to all livestock commodities by share of gross livestock production.

Pest Control. Pest control was allocated to all crops except feed crops by share of gross of crop production.

Crop Insurance

Crop insurance, estimated at 2 billion rubles based on average 1983-87 insurance subsidies of roughly 1.9 billion rubles (27), was allocated to all crops by share of gross crop production.

Social Investment

This program for investment on low-profit and unprofitable collective farms was initiated in 1983. Funds were allocated to all commodities by gross agricultural production.

Coefficients Utilized in Allocating Direct Producer Subsidies

1--Livestock product shares of roughage crops:

	Percent
Milk	44
of which:	
cheese	3
butter	22
other milk	19
Beef	43
Mutton and lamb	5

2--Shares of gross crop production:

	With feed crops	Excluding feed crops
	Percent	
Wheat	12.1	14.7
Coarse grain	18.8	22.9
Rice	1.1	1.3
Cotton	6.7	8.1
Sugar beets	4.5	5.5
Sunflowerseed	1.4	1.8
Soybeans	0.3	0.4
Feed crops	17.7	

3--Shares of gross livestock production:

	Percent
Beef	27.2
Pork	13.6
Mutton and lamb	2.8
Poultry	6.6
Milk	33.7
of which:	
cheese	2.4
butter	16.8
other milk	14.5
Eggs	6.5

To determine shares of gross agricultural production, the livestock shares were multiplied by 0.55 and the crop shares by 0.45.

Appendix B: Calculating Producer Prices

The producer prices used in PSE estimation were average farmgate prices supplemented for transportation and processing margins and discounted for the value of byproducts. The two primary sources for these estimates were Struktura roznichnykh tsen (22) and Zakupochnye tseny (29). The latter provides average farmgate prices for agricultural commodities. It provides data only for raw commodities, such as live animals, sugarbeets, and raw milk. The former provides data for the Russian Republic for 1985 on processing and marketing margins and on the value of byproducts. It provides data for the processed agricultural commodities such as butter, sugar, sunflowerseed oil, and meats on a retail weight basis. Cheese data were available only for 1983 (23). The ratio of farmgate prices for the USSR in 1986 and the Russian Republic in 1985 (29) was used in converting the Russian Republic farmgate price data in (22). The processing and marketing margins and the value of byproducts are taken directly from (22) without adjustment.

Commodity coverage in Zakupochnye tseny (used in this study):

Grain (all)	Sheep and goats
Sunflowerseed	Hogs
Sugarbeets	Poultry
Cotton	Raw milk
Cattle	Hen eggs

Commodity coverage in Struktura, 1985 or 1983 (used in this study):

Beef	Sugar
Mutton	Sunflowerseed oil
Pork	Full fat cheese (krupnyy)
Whole milk	Full fat cheese (mel'kiy)
Butter	

Producer prices for soybeans come from (13). Producer prices were broken out for wheat and coarse grain based on information in (5) and (4). The rice producer price was estimated based on the base price for rice (exclusive of quantity and quality bonuses) in (4). Marketing margins were estimated for poultry and cotton. No marketing margins were introduced for wheat, coarse grains, eggs, and the oilseeds because of the unprocessed nature of the imported commodities at the border. (However, some cleaning and drying of these products occur at the procurement agency level and should be added in, if available, to make domestic production comparable with imports.)

Cheese producer prices were an unweighted average of the two cheese categories for 1983, adjusted to 1986 by the percentage increase in butter producer prices between 1983 and 1986 (22, 23). The commodity "other milk" used whole milk prices and included marketed milk not used in cheese or butter production, plus an estimate of onfarm human consumption of milk. The coefficients to convert butter and cheese to whole milk equivalent were 20 and 9, respectively.

Appendix C: Calculating Consumer Prices

Consumer commodities not marketed through the state trade network were valued at average producer prices. Prices for the state trade network were taken from (20) and (22). For wheat and coarse grain, the consumer was defined as the procurement agencies, and accounting prices were used. These prices came from (17) and (18). For sunflowerseed and soybeans, the consumer was defined as a combination of retail consumers for vegetable oil and the mixed feed industry for oilseed meal. Data on sunflowerseed oil retail prices came from (22). Soybean oil prices were assumed to be the same. Oilseed meal prices were based on price data in (15). The coefficients used for the oilseeds were the following: 1 ton of sunflowerseed = .52 tons of sunflowerseed meal + .43 tons of sunflowerseed oil; 1 ton of soybeans = .78 of soybean meal + .18 tons of soybean oil.

Consumer prices for cotton were estimated based on producer prices and per ton subsidies for 1980 in (17), and on increases in cotton subsidies in 1981 and 1983 provided in (18). Consumer prices for cheese were an unweighted average of the two series for cheese for 1983 (23). Consistent with the data for butter, no increase in consumer prices for cheese between 1983 and 1986 was assumed.

Appendix D: Calculating a Shadow Ruble/Dollar Exchange Rate

Previous work concerning Soviet shadow exchange rates includes that of Treml and Kostinsky (24) and Marer (12). Treml and Kostinsky compute coefficients for converting the foreign trade ruble (and thus also the dollar) value of Soviet exports and imports to values in domestic purchasers' prices in 1972. Marer provides estimates of ruble/dollar exchange rates during the 1970's based on purchasing power parity (PPP). (A PPP rate is a rate at which one unit of currency of country A has the same purchasing power when converted into currency of country B to buy goods in country B as it does when buying the same goods in country A.) Marer, for example, presents a PPP rate for 1976 computed by the Central Intelligence Agency (CIA) of 0.49 rubles to the dollar, as compared to the Soviet official rate of 0.75 rubles.

As mentioned in the text, our general method of estimating a shadow exchange rate (not inconsistent with previous work) is to determine how many rubles of resources the Soviets would have to spend to produce domestically one dollar's worth of imports from hard-currency countries. The rate should not be computed from imports solely of agricultural goods. Rather, the appropriate rate should be the single "marginal" (as opposed to average) exchange rate to be applied across the economy. Such a marginal rate should identify the potential cost to the Soviets of domestically producing $1 of imported goods in which the Soviets have the greatest comparative disadvantage (CD). The reason is that at the margin the Soviets would benefit the most from importing such products, by saving the most resources. With respect to major product groups, the Soviets in all likelihood have the strongest CD in comparison with hard-currency countries in agricultural goods and machinery and equipment. In previous work (10) we find that the Soviets most likely have a greater disadvantage in grain than machinery and equipment, which suggests a larger disadvantage in agriculture as compared with machinery. Thus, we base our estimates of the shadow exchange rate solely on imports of agricultural products.

Specifically, the exchange rate equals the ratio of the potential cost to the Soviets of domestically producing agricultural goods imported from hard-currency countries to the aggregate dollar value of the imports (28). Domestic production costs are computed according to Bergson's adjusted-factor-cost standard (1). We use, though, estimates of the marginal cost of production (which capture charges for land). The specific imports included in the calculation are grain, oilseeds, sugar, wool, beef, pork, and mutton. The potential cost of import substitution for oilseeds (primarily soybeans and soymeal) is based on the cost of sunflowerseed production, with a number of adjustments.

Our method of estimating the marginal cost of agricultural production is explained in (9) and (11). The main assumption in the estimation procedure is that the national marginal cost of producing an agricultural good equals average cost in the highest average cost Soviet republic (with adjustment for transport costs).

Appendix E: Reference Price Calculation

The two main sources for reference price calculations were the Soviet Foreign Trade Yearbook (28), which gives average unit values, and producer price data from relevant exporter countries (6). Foreign trade rubles used in the Foreign Trade Yearbook are not equivalent to internal rubles used in calculating the PSE's and CSE's. For trade with hard-currency countries, the unit values reflect hard-currency values converted to foreign trade rubles at the official rate of exchange. To convert to internal rubles, we first applied the official exchange rate for 1986 of $1.42 to the ruble to convert foreign trade ruble values to dollars and then applied our shadow exchange rate of 1.91 rubles per dollar to convert the dollar values to internal rubles.

For the livestock products, adequate foreign trade prices were not available due to limited and/or highly subsidized trade. We used average producer prices from relevant Western countries as a basis for establishing livestock product reference prices. These prices do not include the cost of transportation and some relevant processing and so do not reflect true border prices. However, because of the quality of Soviet domestic production and the effect of producer support in the selected Western countries, discounts rather than mark-ups were applied to most of the selected producer prices to determine an appropriate reference price.

The benchmark used in the processing/marketing chain to calculate the PSE's and CSE's was the point at which the good was imported. The only exception to this was sugar, where an estimated processing margin was applied to imported raw sugar to convert it to the refined product.

Reference prices for specific commodities were defined as follows:

Wheat. The average unit value for all wheat imports for 1986 was taken. Virtually all of this trade comes from hard-currency sources.

Coarse grains. The average unit value for imports of French barley in 1986.

Rice. The average unit value for the import of Burma rice in 1986.

Cotton. The average unit value of Soviet cotton exports in 1986.

Sugar. A weighted average of average unit values for imported raw sugar from Brazil and Thailand in 1986, plus an estimated processing cost of 90 rubles per ton to convert raw to refined sugar.

Sunflowerseed. The soybean reference price divided by 1.15.

Soybeans. Average unit value of Soviet soybean imports in 1986.

Beef. Average cattle producer prices for West Germany in 1986 converted to carcass-weight by a factor of 0.57. A discount of 20 percent was applied to reflect the quality of

Soviet beef production and support to producers in West Germany.

Pork. Average hog producer prices for West Germany in 1986 converted to carcass-weight by a factor of 0.73. A discount of 20 percent was applied to reflect the quality of Soviet pork production and support to producers in West Germany.

Poultry meat. Average French slaughterweight prices for poultry in 1986. A discount of 10 percent was applied to reflect the quality of Soviet domestic production and support to producers in France.

Mutton and lamb. The Static World Policy Simulation Model (SWOPSIM) world price.

Butter. Average producer prices in France in 1986 discounted by 20 percent.

Cheese. Average producer prices in the United Kingdom in 1986 for rindless cheddar discounted by 20 percent.

Other milk. Average French producer price for fluid milk in 1986 (not discounted because of high transport costs to Soviet border).

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